



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/633,791	08/04/2003	Erozan Mehmet Kurtas	I69.12-0554	6890
164	7590	09/21/2004	EXAMINER	
KINNEY & LANGE, P.A. THE KINNEY & LANGE BUILDING 312 SOUTH THIRD STREET MINNEAPOLIS, MN 55415-1002				BAKER, STEPHEN M
		ART UNIT		PAPER NUMBER
		2133		

DATE MAILED: 09/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/633,791	KURTAS ET AL.
	Examiner	Art Unit
	Stephen M. Baker	2133

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on ____.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-4,6-15,17 and 20-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) Claim(s) ____ is/are allowed.
- 6) Claim(s) 1-3,6-15,20,22-25,27 and 28 is/are rejected.
- 7) Claim(s) 4,17,21 and 26 is/are objected to.
- 8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on ____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. ____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 012904, 080403.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: ____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the plural "secondary SISO devices" mentioned in the alternative in claims 7 and 9-11 and required by claims 22, 23, 26 and 28 must be shown (Figure 2 shows only one SISO2 device 40) or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 4, 6, 7, 17, 21 and 26 are objected to because of the following informalities:

In claims 4, 17, 21 and 26, "alternative device states" is vague and apparently should be "possible device states", "allowable device states", "valid device states", or the like. Claims 17 and 21 appear to be essentially redundant. In claims 6 and 7, "equation" and "equations" is poorly worded and confusing and apparently should be "factor" and "factors", respectively.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 6-11, 13, 14, 22-25 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by the published article "Turbo Decoding for PR4: Parallel Versus Serial Concatenation", by Souvignier *et al* (hereafter Souvignier).

Souvignier discloses an iterative decoding systems for a PR4 magnetic recording channel. Figure 3 of Souvignier shows a decoder with a first SISO device (APP

channel) for the precoded PR4 ($1-D^2$) channel, which is modeled by two storage elements and thus has a 4-state trellis. Two further SISO decoders shown by Souvignier (APP Dec1, APP Dec2) of an outer decoder form a "decoding loop", serving as a second SISO device and an "iterating decoder", respectively, each with a 16-state trellis of a constituent convolutional code of a turbo code.

Regarding claim 7, the factor ($1-D^2$) can be considered "complicated" relative to, for example, the dicode channel.

Regarding claim 10, Souvignier shows a de-interleaver (π_1^{-1}) for passing de-interleaved soft outputs to a hard decision element that serves as a "decoder", and also to the other APP decoder (APP Dec1).

Regarding claim 11, Souvignier's turbo outer decoder includes a pair of summing node means with an inverted input for subtracting interleaved and deinterleaved soft output of either decoder from outputs of the other to form interleaved "difference values".

Regarding claim 22, Souvignier's turbo outer decoder APP units operate on LLRs, which are understood by the examiner to comprise sign bits serving as "output bits" and LLR magnitude bits serving as "reliability bits".

Regarding claim 23, Souvignier's turbo outer decoder includes an interleaver (π_1) and a de-interleaver (π_1^{-1}).

Regarding claims 25 and 28, the PR4 channel chosen for Souvignier's inner code represents a factor of ($1-D^2$) in the coded channel response, has a binary "alphabet", and a "channel memory length" of two.

5. Claims 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by the published article "Parity Check Codes for Partial Response Channels" by Oberg *et al* (hereafter "Oberg").

Fig. 3 of Oberg shows a decoder with a first SISO (Channel APP) for dicode, PR4, EPR4, or EE²PR4 magnetic recording channels, which respectively have trellises with 2, 4, 8 and 16 states, thus incorporating a "complicated" factor. A second SISO (Parity APP), in a turbo decoding loop, has a 2-state trellis and thus decodes a "simple factor" of a (parity coded) precoded channel.

6. Claims 7-10 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by the published article "Serial Concatenated Trellis Coded Modulation with Rate-1 Inner Code" by Divsalar *et al* (hereafter "Divsalar").

Fig. 12 of Divsalar shows a decoder with a "complicated" 4-state trellis inner SISO and a 4-state trellis outer SISO, in a turbo decoding loop.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Souvignier in view of U.S. Patent No. 6,556,633 to Brianti *et al* (hereafter "Brianti").

The PR4 channel chosen for Souvignier's target inner code includes a magnetic recording channel which Souvignier does not specify as a "hard drive". Using PR4 channels for hard drives was conventional at the time the invention was made, as disclosed by Brianti (col. 1, lines 56-62). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to apply Souvignier's decoding system to the PR4 channel of a hard drive. Such an application would have been obvious because using PR4 channels for hard drives was already conventional practice, as disclosed by Brianti.

9. Claims 15, 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Souvignier in view of the published article "VLSI Architectures for Turbo Codes" by Masera *et al* (hereafter "Masera").

Souvignier does not disclose the hardware for carrying out the APP algorithms, and thus does not specify a "parallel architecture" for carrying out the APP algorithms. Official Notice is taken that the advantage of using a "parallel architecture" for carrying out algorithms, namely increased processing speed, was common knowledge at the time the invention was made. Masera discloses using parallel architectures for APP decoders in a turbo decoder. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to implement Souvignier's decoding system using a "parallel architecture" for carrying out the APP algorithms. Such an implementation would have been obvious because the advantage of using a "parallel architecture" for carrying out algorithms, namely increased processing speed, was

common knowledge at the time the invention was made, and because Masera discloses using parallel architectures for APP decoders in a turbo decoder.

Allowable Subject Matter

10. Claims 4, 17, 21 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen M. Baker whose telephone number is (703) 305-9681. The examiner can normally be reached on Monday-Friday (11:00 AM - 7:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert DeCady can be reached on (703) 305-9595. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Stephen M. Baker
Primary Examiner
Art Unit 2133

smb